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明 細 書

1. 発明の名称

ベクチンの部分脱メトキシル化法

2. 特許請求の範囲

1. ベクチンを炭酸又は燐酸のナトリウム又はカリウム塩で処理することを特徴とするベクチンの部分脱メトキシル化法。
2. ベクチンがベクチンの水溶液であることを特徴とする特許請求の範囲第1項記載のベクチンの部分脱メトキシル化法。
3. ベクチンが乾燥状態のベクチン含有植物であり、炭酸又は燐酸のナトリウム又はカリウム塩が水溶液であり、且つ、水溶液の量が乾燥状態の該植物の重量以下であることを特徴とする特許請求の範囲第1項記載のベクチンの部分脱メトキシル化法。

3. 発明の詳細な説明

〔産業上の利用分野〕

本発明はベクチンの部分脱メトキシル化法に関する。更に詳しくは柑橘類果皮等ベクチン含有植

物からベクチンを抽出するに際してベクチンの部分的にメチルエステル化されているD-ガラクトロン酸のエステル部分を部分的に脱メトキシル化してメトキシル化度を調節する方法に関する。

ベクチン分子中のD-ガラクトロン酸のメトキシル化度によってベクチンの性質が異なり、メトキシル化度50%以上のものはハイメトキシル(HM)ベクチン、50%以下のものはロウメトキシル(LM)ベクチンと分類される。さらにHMベクチンにおいてはそのメトキシル化度によりゲル化速度が異なってくるのでそのメトキシル化度によりラビッドセット、ミディアムセット、スローセットに分けられている。LMベクチンにおいてもメトキシル化度によりゲルの硬さや弾力性等性質が異なってくるのでベクチンを製造する上でメトキシル化度の調節は重要である。

〔従来技術〕

柑橘類果皮等ベクチン含有植物からベクチンを製造するには通常、乾燥したベクチン含有植物をpH1.5乃至2.5の塩酸や硫酸のような無機酸水

溶液に投入して60℃乃至100℃で30分間乃至数時間攪拌してペクチン分を抽出する。次いでこの抽出液を遠心分離や圧搾等により不溶解分を分離し、残渣通過後必要に応じ濃縮後、メタノール、イソプロピルアルコール、アセトン等の水混和性有機溶剤を加えて沈殿させるか、あるいはアルミニウム、銅、鉄等の金属の塩を添加してペクチンを該金属塩として沈殿させ、脱水回収する。金属塩法による場合は総じて酸性アルコール等で沈殿を洗浄し、金属分を除去して可溶化させる必要がある。いずれの場合でも、ペクチンの沈殿を乾燥、粉碎して粉末ペクチンとする。

このプロセスで何もメトキシル化度を調節しなければ抽出条件等にもよるが例えば70～75%というような比較的メトキシル化度の高いものしか得られず、いわゆるHMペクチンのラビッドセプトタイプしか得ることはできない。

メトキシル化度の調節方法としては

①酸による抽出を長時間行なうあるいは高濃度の酸の水溶液で抽出するなど抽出条件を厳しいも

する塩が製品中に大量に残留し、この塩の除去のため繰り返し洗浄をしなければならないという問題があった。

乾燥ペクチン含有植物を酸溶液中に浸漬する方法は該植物を数倍量の1～2規定の酸水溶液中に浸漬し、スラリー状で脱メトキシル化するものであるが、処理される植物量に対しかなり大量の酸を使用するため酸の種類によっては製造プロセス中で設備材料の腐食の問題やその後の中和により発生する塩の量が多く従って製品中の残留量も多くなるという問題がある。

さらにこれらの方法に共通する問題として酸による脱メトキシル化は反応速度が極めて遅いため長時間に渡って処理を行なう必要があり、この対策として反応温度を高くするとグリコシド結合の開裂等副反応が生じ、製品品質低下の原因となる。

【問題点を解決するための手段】

本発明の要旨はペクチンを炭酸又は磷酸のナトリウム又はカリウム塩で処理することを特徴とするペクチンの部分脱メトキシル化法にある。

のとすることにより抽出とメトキシル化度の調節を同時に行なう方法。

②脱水回収されたペクチンを酸を含むアルコールで処理する方法。

③ペクチン含有植物を酸溶液中に浸漬する方法。が知られている。

【発明が解決しようとする問題点】

しかし抽出時にメトキシル化度を調節する方法は抽出を有利に行なう目的で60～100℃という高温下で処理するため、脱メトキシル化と共にグリコシド結合の開裂も進行し、ペクチンの分子最低下即ち品質の低下は避けられず、場合によっては製品収率も低下する。

脱水回収されたペクチンを酸を含むアルコールで処理する方法は比較的低温の処理であるためペクチンの品質低下は少ないが、処理されるペクチンと等量又はそれ以上の高濃度酸を含むアルコールで処理するため使用する酸のコストが高くなる、処理後残留する酸を中和する必要があるためアルカリを費し、さらに中和の際に生成

従来アルカリによる処理は反応は速いが、反応の制御が難しく、製品の品質低下を招くため不適当とされていた。しかし適切なアルカリを選択すればこのような欠点もなく反応速度も速く処理できることを見出し本発明を完成したものである。

本発明で用いられるアルカリは炭酸又は磷酸のナトリウム又はカリウム塩であり、具体的には炭酸ナトリウム、炭酸水素ナトリウム、炭酸カリウム、炭酸水素カリウム、磷酸二ナトリウム、磷酸二カリウム、磷酸三ナトリウム、磷酸三カリウムを挙げることができる。もちろんこれらを混合して用いてもよい。水酸化ナトリウムや水酸化カリウム等の強アルカリは脱メトキシル反応の速度が極めて遅いため反応制御が困難である。

使用するアルカリの量は使用するアルカリ種にもよるが、系のpHを9～10程度に保つような量添加すればよい。脱メトキシル化が進むにつれて系のpHは低下してくるので適宜弱アルカリを追加するなり、炭酸ナトリウムと炭酸水素ナトリウムとの併用を行なう等をすればよい。

ペクチンのこれらの弱アルカリによる処理はペクチン製造における種々の工程で行なうことができる。即ち、ペクチン含有植物を処理してもよく、ペクチン含有植物からペクチンを抽出して得られる抽出液、抽出液から不溶解分を除去して得られる液、この液からペクチンを沈澱させて得られる沈澱のいずれを処理しても良い。

ペクチン含有植物を処理する場合は該植物重量に対し3倍程度以上の弱アルカリ水溶液を添加し、充分均一なスラリー状として反応させることが好ましい。

抽出液又はこれから不溶解分を除去した液を処理する場合はこれらの液に弱アルカリ水溶液を添加混合して反応させればよい。この添加の液比は特に限定されるものではなく、pHを上記の範囲に調節できる量添加すればよい。

ペクチン沈澱物を処理する場合は沈澱が溶解しないよう水混和性有機溶剤と該弱アルカリ水溶液との混合溶液を用いる。沈澱が実質的に溶解しないようにするには水と水混和性有機溶剤の液比は

1/1以下とする。この水混和性有機溶剤としてはメタノール、エタノール、イソプロピルアルコール、アセトン等を例示することができる。沈澱物に対する該混合溶液の量は沈澱に対し等重量乃至数倍量用い、充分均一となるように混合するのが好ましい。等量以下では反応が均一に反応しなくなる傾向にある。多すぎる場合は溶剤の回収や使用アルカリ量等により経済的に不利となる。

これらのいずれの工程でアルカリ処理を行なう場合でも反応時系の温度を30℃以下に保つことが好ましい。30℃を越えるとグリコシド結合のβエリミネーションが進行し、ペクチン品質に影響を与えるおそれが生ずるので好ましくない。

【実施例】

以下に実施例を用いて本発明をさらに詳しく説明する。

なお実施例においてゼリーグレードはIFT法(フードテクノロジー13巻496-500(1959))にて評価し、メトキシル化度はフードケミカルスコーデックス(Food Chemicals Codex)第3版に

記載された鹼化滴定法に依った。

実施例1

オレンジの搾汁果皮の乾燥物400gを30gの炭酸カリウムを溶解した4Lの水の中に入れ攪拌混合して2時間放置した。水温は15℃であった。次にこの混合液に水1.0Lを加え、攪拌した後塩酸を用いてpHを2.0とし、昇温して90℃で30分間攪拌抽出を行なった。次に不溶解分を遠心分離して除去し、得られた上澄液に珪藻土濾過助剤を0.5%加え加圧濾過して清澄濾液7.8kgを得た。この濾液に60%容積濃度となるようにイソプロピルアルコールを加え析出したペクチンの沈澱を分離し、圧搾、乾燥、粉碎して粉末ペクチン64gを得た。得られたペクチンのメトキシル化度は60.5%であり、ゼリーグレードは199であった。

実施例2

レモンの搾汁果皮の乾燥物400gを20gの炭酸三ナトリウムを溶解した3.5Lの水の中に入れ攪拌混合して水温15℃で1.5時間放置した。以

下実施例1と同様にして抽出精製を行なって粉末ペクチンを得た。得られたペクチンのメトキシル化度は63.5%であり、ゼリーグレードは193であった。

実施例3

レモンの搾汁果皮の乾燥物400gを23gの炭酸ナトリウムと6gの炭酸水素ナトリウムとを溶解した4Lの水の中に入れ攪拌混合して水温15℃で3時間放置した。以下実施例1と同様にして抽出精製を行なって粉末ペクチンを得た。得られたペクチンのメトキシル化度は59.7%であり、ゼリーグレードは203であった。

実施例4

オレンジの搾汁果皮の乾燥物300gに水を加え全量を10Lとした後塩酸を用いてpHを2.0とし昇温して90℃で30分間攪拌抽出を行なった。この抽出液を25℃まで冷却した後炭酸カリウム30gを溶解した水500mLを添加混合し2時間反応させた後塩酸で中和した。次いで不溶解分を遠心分離で除去し、得られた上澄液に珪藻

土濾過助剤を0.5%加え、加圧濾過して精澄濾液を得た。この濾液に60%容量濃度となるようイソプロピルアルコールを加え析出したペクチンの沈殿を分離、乾燥、粉碎して粉末ペクチンを得た。得られたペクチンのメトキシル化度は62.5%であり、ゼリーグレードは193であった。

実施例5

レモンの搾汁果皮の乾燥物300gを実施例4と同様にして抽出した。この抽出液から不溶解分を除去して精澄濾液80mlを得た。この濾液を20℃まで冷却した後炭酸ナトリウム21gと炭酸水素ナトリウム6gとを溶解した500mlの水と混合し、3時間反応させた後塩酸で中和し、以下実施例1と同様にして粉末ペクチンを得た。得られたペクチンのメトキシル化度は57.6%であり、ゼリーグレードは196であった。

実施例6

レモンの搾汁果皮の乾燥物300gに水を加え全量が10lとなるようにした後、塩酸を用いてpHを2.0とし昇温して90℃で30分間攪拌抽

出を行なった。次に不溶解分を遠心分離して除去し、得られた上澄液に珪酸土濾過助剤を0.5%加え加圧濾過して精澄濾液83kgを得た。この濾液に60%容量濃度となるようにイソプロピルアルコールを加え析出したペクチンの沈殿を分離し、圧搾して固形分濃度25%の沈殿225gを得た。この沈殿に3gの炭酸カリウムを溶解した60%容量濃度のイソプロピルアルコール400mlを加え攪拌混合して1時間反応させた。以下実施例5と同様にして中和、濾過、圧搾、乾燥、粉碎して粉末ペクチンを得た。得られたペクチンのメトキシル化度は62.0%であり、ゼリーグレードは193であった。

比較例1

レモン及びオレンジの搾汁果皮の乾燥物各々400gを弱アルカリによる前処理をしない以外は実施例1と同様にして抽出精製乾燥粉碎を行なったペクチンを得た。レモン搾汁果皮の乾燥物からのペクチンのメトキシル化度は73.3%であり、ゼリーグレードは208であり、オレンジからの

【発明の効果】

以上の実施例から明らかなように炭酸又は炭酸のナトリウム又はカリウム塩を用いてペクチンのメトキシル化度を調節する本願発明は短時間にメトキシル化度を調節でき、しかも従来言われていたようなアルカリによるペクチンの品質低下をまねくこともないという優れた効果を有している。

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APPLICANT : MITSUBISHI ACETATE CO LTD;

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TITLE : PARTIAL DEMETHOXYLATION OF PECTIN

ABSTRACT : PURPOSE: To effect the partial demethoxylation of the ester part of the partially methyl-esterified D-galacturonic acid of pectin, in a short time, without causing the degradation of pectin, by treating pectin with Na or K salt of carbonic acid or phosphoric acid.

CONSTITUTION: In the production of pectin from a pectin-containing vegetable such as peel of citrus fruit, etc., the pectin is treated with Na or K salt of carbonic acid or phosphoric acid (preferably used in the form of aqueous solution). The treatment is carried out by adding the salt at a rate to keep the pH to preferably 9-10, at $\leq 30^{\circ}\text{C}$. The ammonia treatment may be performed in arbitrary stage in the production of pectin.

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(54) PARTIAL DEMETHOXYLATION METHOD OF PECTIN

SPECIFICATION

1. TITLE OF THE INVENTION

Partial Demethoxylation Method of Pectin

2. CLAIMS

1. A partial demethoxylation method of a pectin characterized by treating the pectin by a sodium or potassium salt of carbonic acid or phosphoric acid.

2. A partial demethoxylation method of a pectin as set forth in claim 1, wherein the pectin is an aqueous solution of the pectin.

3. A partial demethoxylation method of a pectin as set forth in claim 1, wherein the pectin is a pectin-containing plant in a dry state, the sodium or potassium salt of carbonic acid or phosphoric acid is an aqueous solution, and the amount of the aqueous solution is not more than the weight of the plant in the dry state.

3. DETAILED DESCRIPTION OF THE INVENTION

[Field of Utilization in Industry]

The present invention relates to a partial demethoxylation method of a pectin. In more detail, the present invention relates to a method of partially demethoxylating an ester portion of partially methyl esterified D-galacturonic acid of a pectin to adjust the degree of methoxylation when extracting a pectin from a pectin-containing plant such as

citrus peel.

The properties of pectins differ according to the degree of methoxylation of the D-galacturonic acid in the pectin molecule. Pectins having a degree of methoxylation of 50% or more are classified as high methoxy (HM) pectins, while those having a degree of methoxylation of less than 50% are classified as low methoxy (LM) pectins. Further, in HM pectins, the gelation speed differs according to the degree of methoxylation thereof, so these pectins are classified as a rapid set, a medium set, and a slow set according to the degree of methoxylation thereof. In LM pectins, the properties such as the hardness of the gel and elasticity differ according to the degree of methoxylation, so the adjustment of the degree of methoxylation is important for producing a pectin.

[Prior Art]

For producing a pectin from a pectin-containing plant such as citrus peel, usually a dried pectin-containing plant is placed into an aqueous solution of an inorganic acid such as hydrochloric acid or sulfuric acid having a pH of 1.5 to 2.5 and stirred for 30 minutes to a few hours at 50°C to 100°C to extract the pectin component. Then, the insolubles of this extract are separated by centrifugal separation or pressing, the supernatant is filtered, then, according to need, condensed, then a water miscible solvent such as methanol, isopropyl alcohol, or acetone is added to cause precipitation or a salt of a metal such as aluminum, copper, or iron is added to cause the pectin to precipitate as a metal salt, and the result is dehydrated and recovered. In the case of the metallic salt method, it is necessary to wash the precipitate by an acidic alcohol or the like and eliminate the metal component to make it soluble. In any case, the precipitate of the pectin is dried and crushed to form a pectin powder.

If no adjustment of the degree of methoxylation is carried out in this process, though according to some extraction conditions, only pectins having a relatively high degree of methoxylation of for example 70 to 75% can be obtained, and only so-called rapid set type HM pectins can be obtained.

As the method of adjustment of the degree of methoxylation, there are known:

[1] a method of simultaneously performing the extraction and the adjustment of the degree of methoxylation by setting severe extraction conditions, for example, performing the extraction by acid over a long time or extracting the pectin by an aqueous solution containing a high concentration of acid;

[2] a method of treating the dehydrated and recovered pectin by an alcohol containing an acid; and

[3] a method of dipping a pectin-containing plant in an acidic solution.

[Problems to be Solved by the Invention]

However, the method of adjusting the degree of methoxylation at the time of extraction calls for treatment at high temperature such as 50 to 100°C for the purpose of advantageously performing the extraction, therefore also cleavage of glycoside bonds advances together with the demethoxylation, a drop in the molecular weight of the pectin, that is, a drop in the quality cannot be avoided, and, in certain cases, also the product yield is lowered.

The method of treating dehydrated and recovered pectin by an alcohol containing an acid calls for treatment at a relatively low temperature, therefore the drop in the quality of the pectin was small, but has the problems that the pectin has to be treated by an alcohol containing a high concentration of acid in an equal or greater amount to that of the pectin to be treated, so the cost of the used acid became high, it is necessary to neutralize the residual acid after the treatment, therefore alkali is required, and further a large amount of salt generated at the neutralization remains in the product, so washing has to be repeatedly carried out for removing this salt.

The method of dipping a dried pectin-containing plant in an acidic solution calls for dipping the plant in a 1 to 2N acidic aqueous solution of an amount a few times the amount of the plant and demethoxylating the result in a slurry state, but a considerably large amount of acid is used with respect to the amount of the plant to be treated. Therefore, according to some types of acid, there are the problem of corrosion of the equipment material in the production process and the problem that the amount of the salt generated due to the neutralization after the production is large and accordingly also the residual amount in the product becomes large.

Further, as a problem common to these methods, the demethoxylation by acid has an extremely slow reaction speed, therefore it is necessary to perform the treatment over a long time, and if the reaction temperature is made high as a countermeasure for this, a secondary reaction such as cleavage of the glycoside bonds occurs, which becomes a cause of a drop in the quality of the product.

[Means for Solving the Problems]

The gist of the present invention resides in a partial demethoxylation method of a pectin characterized by treating a pectin by a sodium or potassium salt of carbonic acid or phosphoric acid.

In the conventional treatment by an alkali, the reaction is fast, but it is difficult to control the reaction, and a drop in the quality of the product is induced, so it has been regarded as unsuitable. However, the inventors found that, if a suitable alkali was selected, the treat could be performed with a fast reaction speed without such a defect and thereby completed the present invention.

The alkali used in the present invention is a sodium or potassium salt of carbonic acid or phosphoric acid. Specifically, there can be mentioned sodium carbonate, sodium bicarbonate, potassium carbonate, potassium bicarbonate, disodium phosphate, dipotassium phosphate, trisodium phosphate, and tripotassium phosphate. They can be naturally also used in mixtures. A strong alkali such as sodium hydroxide and potassium hydroxide gives an extremely fast demethoxylation reaction, so it is difficult to control the reaction.

The amount of the alkali to be used is determined also according to the type of the used alkali, but the alkali may be added in a amount that keeps the pH of the system to about 9 to 10. Along with the advance of the demethoxylation, the pH of the system is lowered, therefore a weak alkali may be appropriately added or used together with the sodium carbonate or the sodium bicarbonate and so on.

The treatment of a pectin by these weak alkalis can be carried out in various steps in the production of a pectin. Namely, a pectin-containing plant can be treated too, or either of the extract obtained by extracting a pectin from a pectin-containing plant or a precipitate obtained by precipitating a pectin from this solution can be treated as well.

In the case of treating a pectin-containing plant, preferably a weak alkali aqueous solution of a weight about 3 times or more the weight of the plant is added to obtain a sufficiently homogeneous slurry state for the reaction.

When treating an extract or a solution obtained by removing the insolubles from this, a weak alcohol aqueous solution may be added to these solutions and mixed to cause the reaction. The ratio of the added solutions is not particularly limited. They may be added in amounts that can adjust the pH to within the above range.

In the case of treating a pectin precipitate, use is made of a mixed solution of a water miscible organic solvent and a weak alkali aqueous solution so as not to dissolve the precipitate. In order not to substantially dissolve the precipitate, the liquid ratio between the water and the water miscible organic solvent is set to 1/1 or less. As this water miscible organic solvent, methanol, ethanol, isopropyl alcohol, acetone, etc. can be exemplified. Preferably, use is made of a mixed solution of an equal weight with respect to the precipitate or a few times the amount of the precipitate. The mixing is carried out so that a sufficient homogeneous mixed solution is obtained. If the amount is less than an equal amount with respect to the precipitate, it tends to become hard to uniformly cause the reaction. When the amount is too large, it becomes economically disadvantageous due to the recovery of the solvent and according to the amount of the used alkali etc.

No matter at which of these steps the alkali treatment is carried out at, preferably

the temperature of the reaction system is held at 30°C or less. When it exceeds 30°C, β -elimination of the glycoside bonds proceeds and there may be an effect upon the quality of the pectin, so this not preferred.

[Examples]

The present invention will be explained in further detail below by using examples.

Note that, in the examples, the jelly grade was evaluated by the IFT method (*Food Technology*, Vol. 13, 496-500 (1959)), and the degree of methoxylation was according to the corrosion titration method disclosed in the *Food Chemicals Codex*, 3rd edition.

Example 1

400 g of dried peel of squeezed lemons was placed in 4 liters of water in which 30 g of potassium carbonate was dissolved, then was stirred, mixed, and allowed to stand for 2 hours. The water temperature was 15°C. Next, 10 liters of water was added to this mixed solution, then this was stirred and was controlled in pH to 2.0 by using hydrochloric acid, was elevated in temperature, and was stirred and extracted at 90°C for 30 minutes. Next, the insolubles were centrifugally separated and removed, 0.5% of a diatomaceous earth filter aid was added to the obtained supernatant, then the result was filtered under pressure to obtain 7.8 kg of clear filtrate. To this filtrate, isopropyl alcohol was added so as to obtain a 60 vol% concentration. The thus precipitated precipitate of the pectin was separated, pressed, dried, and crushed, thereby to obtain 64 g of a pectin powder. The degree of methoxylation of the obtained pectin was 60.5%, and the jelly grade was 199.

Example 2

400 g of dried peel of squeezed lemons was placed in 3.5 liters of water in which 20 g of trisodium phosphate was dissolved, then was stirred, mixed, and allowed to stand at a water temperature of 15°C for 1.5 hours. Below, the extraction and purification were carried out in the same way as Example 1 to obtain a pectin powder. The degree of methoxylation of the obtained pectin was 63.6%, and the jelly grade was 193.

Example 3

400 g of dried peel of squeezed lemons was placed in 4 liters of water in which 23 g of sodium carbonate and 6 g of sodium bicarbonate were dissolved, then was stirred, mixed, and allowed to stand at a water temperature of 15°C for 3 hours. Below, the extraction and purification were carried out in the same way as Example 1 to obtain a pectin powder. The degree of methoxylation of the obtained pectin was 59.7%, and the

jelly grade was 203.

Example 4

Water was added to 300 g of dried peel of squeezed oranges to 10 liters, then the result was controlled in pH to 2.0 by using hydrochloric acid, was elevated in temperature, and was stirred and extracted at 90°C over 30 minutes. This extract was cooled to 25°C, then 500 ml of water in which 30 g of potassium carbonate was dissolved was added and mixed. The result was reacted for 2 hours, then neutralized by hydrochloric acid. Then, the insolubles were removed by centrifugal separation, and 0.5% of a diatomaceous earth filter aid was added to the obtained supernatant which was then filtered under pressure to obtain a clear filtrate. To this filtrate, isopropyl alcohol was added to a 60 vol% concentration, then the thus precipitated precipitate of pectin was separated, dried, and crushed, thereby to obtain a pectin powder. The degree of methoxylation of the obtained pectin was 62.5%, and the jelly grade was 193.

Example 5

300 g of dried peel of squeezed lemons was extracted in the same way as Example 4. The insolubles were removed from this extract to obtain 8.0 liters of a clear filtrate. This filtrate was cooled to 20°C, and then mixed with 500 ml of water in which 21 g of sodium carbonate and 6 g of sodium bicarbonate were dissolved, reacted for 3 hours, then neutralized by hydrochloric acid, and treated in the same way as Example 1, to thereby obtain a pectin powder. The degree of methoxylation of the obtained pectin was 57.6%, and the jelly grade was 196.

Example 6

Water was added to 300 g of dried peel of squeezed lemons to 10 liters, then the result was controlled in pH to 2.0 by using hydrochloric acid, was elevated in temperature, and was stirred and extracted at 90°C over 30 minutes. Next, the insolubles were removed by centrifugal separation, and 0.5% of a diatomaceous earth filter aid was added to the obtained supernatant, which was then filtered under pressure to obtain 8.3 kg of a clear filtrate. To this filtrate, isopropyl alcohol was added to 60 vol% concentration, then the thus precipitated precipitate of pectin was separated and pressed to obtain 225 g of a precipitate with a 25% solids concentration. To this precipitate, 400 ml of isopropyl alcohol having a 60 vol% concentration in which 3 g of potassium carbonate was dissolved was added. The result was stirred, mixed, and reacted for 1 hour. Below, the neutralization, filtration, pressing, drying, and crushing were carried out in the same way as Example 5 to obtain a pectin powder. The degree of methoxylation of the obtained pectin was 62.0 %, and the jelly grade was 193.

Comparative Example 1

The extraction, purification, drying, and crushing were carried out in the same way as Example 1 to obtain pectin except for not pretreating 400 g of dried peels of squeezed lemons and oranges by weak alkali. The degree of methoxylation of the pectin from the dried peel of squeezed lemons was 73.3% and the jelly grade was 208, while the degree of methoxylation of the pectin from the oranges was 67.8%, and the jelly grade was 185.

[Effect of the Invention]

As apparent from the above examples, the invention of the present application adjusting the degree of methoxylation of a pectin by using a sodium or potassium salt of carbonic acid or phosphoric acid has the excellent effects that the degree of methoxylation can be adjusted in a short time and, in addition, the drop in the quality of the pectin due to the alkali which had been conventionally reported is not induced.
